

# United States Patent [19]

Abramovitch et al.

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[54]	RE-WRITABLE OPTICAL DISK HAVING
	REFERENCE CLOCK INFORMATION
	PERMANENTLY FORMED ON THE DISK

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[56]

#### References Cited

#### **U.S. PATENT DOCUMENTS**

3,891,794	6/1975	Russell	178/6.7 R
3,963,862	6/1976	Bouwhuis	178/6.6 R
4,238,843	12/1980	Carasso et al	. 365/234
4,363,116	12/1982	Kleuters et al	369/30
4,366,564	12/1982	de Haan et al	369/48
4,375,088	2/1983	de Haan et al	. 365/234
4,716,560	12/1987	Itonaga	369/275
4,907,216	3/1990	Rijnsburger	369/275.1
4,972,401	11/1990	Carasso et al	369/59
5,023,856	6/1991	Raaymakers et al	369/32
5,182,741	1/1993	Maeda et al	369/58
5,315,571	5/1994	Maeda et al	369/50
5,682,365	10/1997	Carasso et al	369/54

## FOREIGN PATENT DOCUMENTS

2 087 628 11/1981 United Kingdom ............ G11B 27/30

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[57]

### **ABSTRACT**

An optical disk structure and optical disk recorder which enables data to be rewritten onto the recording layer of the optical disk. A clock reference structure is permanently formed along servo tracks of the optical disk. An optical transducer is coupled to the clock reference structure and generates a clock reference signal simultaneously with writing new data onto the recording layer of the optical disk. The data is written as data marks along the servo tracks. Each of the data marks includes edges. The edges of the data marks are recorded in synchronization with a write clock. The write clock is phase-locked with the clock reference signal. Therefore, the edges of the data marks are aligned with the clock reference structure with sub-bit accuracy. Standard DVD-ROM disk readers are not able to detect the high spatial frequency of the clock reference structure. Therefore, the optical disk structure and optical disk recorder of this invention allow production of re-writable optical disks which can be read by standard DVD-ROM disk readers.

37 Claims, 16 Drawing Sheets